DETAILED ACTION

(1). Applicants' Remarks filed on 10/30/2009 has been received.

The rejections of claims 1-14 in prior Office Action dated 7/31/2009 is withdrawn in view of the current Remarks.

However, a new ground of rejection is presented herein.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(2). **Claims 1-6** are rejected under 35 U.S.C. 102(e) as being anticipated by Durham et al (US 7361209B1).

As to a method for removing mercury vapors from waste gas comprising contacting waste gas with a scrubbing agent comprising organic sulfoxides in **independent claim 1**, scrubbing agent being essentially pure organic sulfoxides in **claim 2**, waste gas to be a combustion flue gas in **claim 4,** scrubbing agent to be an emulsion of water-in-organic sulfoxides in **claim 3**, waste gas to be a gas mixture released from a chemical process in **claim 5**, Durham et al (US 7361209B1) disclose apparatus and process for preparing sorbents for mercury control at point of use (Title). It is directed generally to treatment of gases to remove controlled materials and specifically to the treatment of flue gases to remove mercury and other contaminants (Col. 1, line 14-17). **Air toxics** are present in the flue gas of combustion sources and appear both as particulate metals such as nickel, arsenic, and chromium in flyash particles and as **vapor phase** metals such as **mercury**, selenium, halogens, and halides and organic vapors. Vapor phase air toxics are commonly present in flue gas in trace concentrations of parts per million or less and therefore can be difficult to remove to comply with pertinent regulations (Col. 1, line 30-38). The further treatment device(s) 116 can remove contaminants not removed sufficiently by the

sorbent. Typically, the device(s) include a flue gas desulfurizer and is preferably a wet flue gas desulfurizer. The flue gas desulfurizer 116 typically removes at least most of the acid gases (e.g. sulfur dioxide and halogen chloride) and **some of the air toxics** – it would include the mercury vapor. Examples of desulfurizers include spray tower, bubbling bed reactors, wet scrubbers, semi-wet scrubbers, dry scrubbers and combinations thereof. The preferred desulfurizer is a wet scrubber having a vertical tower construction. Examples of **scrubbing agents** include a non-aqueous solvent, an **emulsion of water-in-organic sulfoxides** (Col. 4, line 4-26). Flue gas is well known as product of combustion (chemical process) in the art (Col. 1, line 21-22).

As to wherein a stream of air or of ozonated air is added to the stream of waste gas in **claim 6**, Durham et al (US 7361209) disclose air compressor 218 in air line 216 (Col. 5, line 34-37).

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(3). **Claims 7-11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Durham et al (US 7361209B1).

As to wherein the organic sulfoxides are oil derived sulfoxides in **claim 7,** oil derived sulfoxides being derived from the diesel fraction of oil in **claim 8**, it is noticed that process limitation for the product in process claim. The patentability of a product does not depend on its method of production. *In re Thorpe, 777 F.2d 695,698, 277 USPQ 964, 966 (Fed. Cir. 1985).*

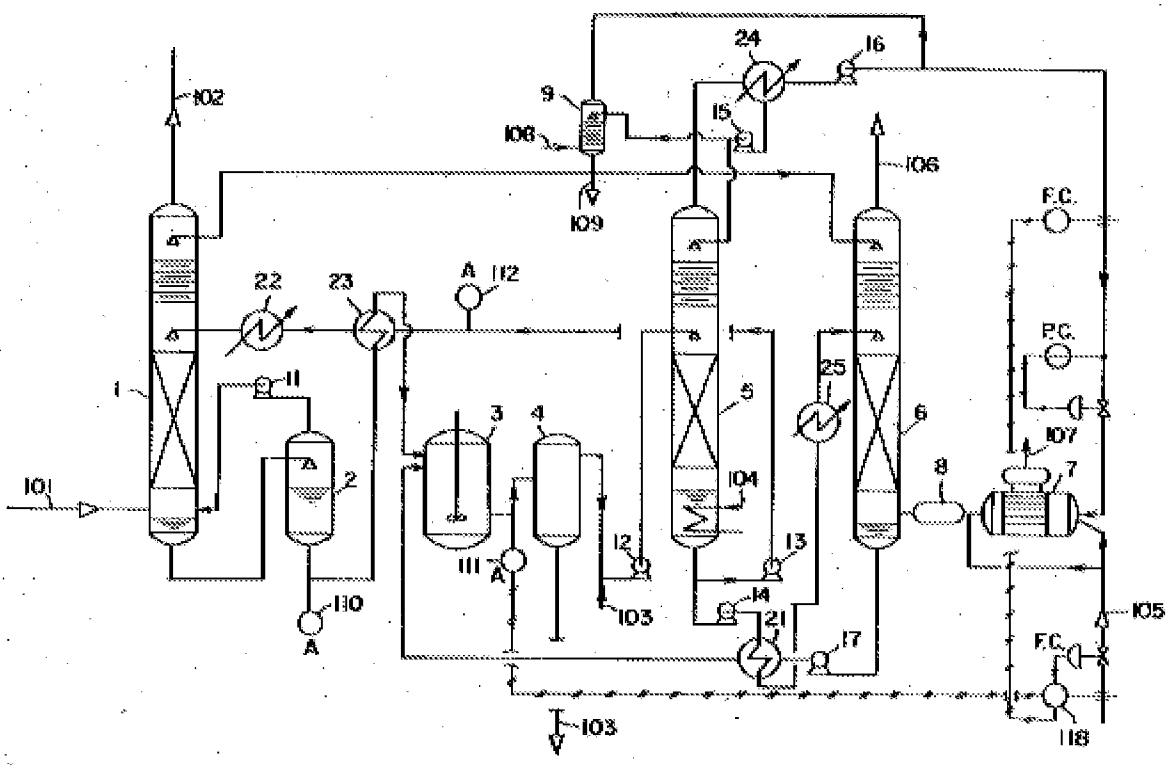
As to weight ratio of water:organic sulfoxide in the emulsion to be in the range 10:90 to 90:10 in **claim 9**, and range 10:90 to 50:50 in **claim 10**, the ratio 1:1 in the range is obvious.

As to weight ratio of water:organic sulfoxides in the emulsion to be 30:70 in **claim 11**, in absence of showing criticality of the records, the optimized weight ratio for water: organic sulfoxides to be 30:70 in a known process render prima facie obvious within one of ordinary skills in the art. *In re Boesch, 617 F.2d 272, 276, 205 USPQ 215,219 (CCPA 1980).*

(4). **Claim 12** is rejected under 35 U.S.C. 103(a) as being unpatentable over Durham et al (US 7361209B1) in view of Tanimura (US 3953586).

As to wherein the scrubbing agent is regenerated after it is loaded, by letting scrubbing agent to separate into tow phases, collecting the upper sulfoxide phase and adding to sulfoxide phase a fresh amount of aqueous solution in **claim 12**, Durham et al **do not teach** the regeneration method of scrubbing solution as claimed.

However, Tanimura (US 3953586) **teaches** process for purifying gases containing H_2S (Title). Solvents used for the process are N-methyl-2-pyrrolidone, tetrahydrothiophene 1-1 dioxide, **dimethyl sulfoxide** and their derivatives that dissolve both H_2S and SO_2, Also mixed solutions prepared by adding to them alkylene glycol, polyalkylene glycol and their derivatives etc. that dissolve SO_2 well can be used (Col. 3, line 34-41). As the absorbing liquid, an **aqueous** solution containing 47.5 vol.% of triethylene glycol and 47.5 vol.% of N-methyl-2-pyrrolidone was used (Example) (Col. 5, line 19-22). As demonstrated in the Figure below. The loaded solvent from absorption column 1, in the settling tank 4, mixing with solvent returned from solvent purifying system 103 (Col. 4, line 3-28).



The advantage of the solvent regeneration is by formulating the cyclic process of operation so that do not pollute atmosphere and water (Col. 2, line 16-17).

Therefore, it would have been obvious at time of the invention to install the solvent regeneration system disclosed by Tanimura for the wet scrubber of Durham et al in order to attain the advantage cited herein above.

(5). **Claims 13-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Durham et al (US 7361209B1) in view of Broderick (US 6942840B1).

As to step of contacting the waste gas with scrubbing agent to be conducted in a tower embedded with inert particles wherein the waste gas is passed upward through tower and the scrubbing agent is circulated downward in a rate which ensures complete wetting of inert particles in **claim 13**, step of contacting the waste gas with scrubbing agent to be conducted in a tower through which the waste gas is passed in an upward direction and the scrubbing agent is sprayed into the tower from the upper opening of the tower forming a fog of scrubbing agent the tower in **claim 14,** Durham et al (US 7361209B1) disclose spray tower of wet flue gas desulfurizer (Col. 4, line 7, 10). Durham et al **do not teach** tower embedded with inert particles as claimed.

However, Broderick (US 6942840B1) **teaches** method for removal and stabilization of mercury in mercury-containing gas streams (Title). It directs to a process and apparatus for removing and stabilizing mercury from mercury-containing gas stream. A gas stream containing vapor phase elemental and/or speciated mercury is contacted with reagent, such as an oxygen-containing oxidant, in a liquid environment to form a mercury-containing precipitate. The mercury-containing precipitate is kept or placed in solution and reacts with one or more additional reagents to form a solid, stable mercury-containing compound (Abstract). A variety of types and shapes of scrubber may be used, including a fixed bed, fluidized bed, random packed bed, and structured packed bed. In a preferred embodiment, the scrubber is a packed vertical column at least partially filled with inert packing material having sufficient surface area to facilitate the contact between the liquid and gas streams and to promote the desired reactions. Preferably, the gas stream and the liquid reagent are introduced into the scrubber in such a manner as to provide a counter current flow (Col. 5, line 15-21, 35-36). The gas/liquid ratio may in adjusted in several ways, e.g., by changing the pump circulation rate or spraying more or less liquor into the scrubber or by changing the gas feed rate (Col. 6, line 14-17).

The advantages of scrubber contact is to improve process to remove vapor phase mercury and mercury-containing compounds from a gas stream and to stabilize the reaction product into a solid, stable compound that can be disposed of as a non-hazardous waste (Col. 2, line 15-19).

Therefore, it would have been obvious at time of the invention to employ the details of mercury vapor scrubber operations disclosed by Broderick for the wet scrubber of Durham et al in order to attain the advantage cited above.

Response to Arguments

(6). Applicant's arguments, see page 4-5, Remarks, filed on 10/30/2009, with respect to the rejection(s) of claim(s) s 1-14 under Ellison Consultants Paper have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Durham et al (US 7361209B1).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu
Art Unit: 1797
Date: January 5, 2010

/Duane Smith/
Supervisory Patent Examiner, Art Unit 1797